Message

From: Whittier, Robert [Robert.Whittier@doh.hawaii.gov]
Sent: 10/24/2016 9:25:30 PM
To: Linder, Steven [Linder.Steven@epa.gov]; steven.chang@doh.hawaii.gov; roxanne.kwan@doh.hawaii.gov; Perry, Thu [Thu.Perry@doh.hawaii.gov]; Frazier, William Mark [william.frazier@doh.hawaii.gov]; Takaba, Richard R [richard.takaba@doh.hawaii.gov]
CC: Donald Thomas [dthomas@soest.hawaii.edu]
Subject: Red Hill Gradients
Attachments: oil-water_interface-table_w-water-levels.xlsx

Good Morning All,

As discussed in this morning's conference, I have compiled and done preliminary interpretation on quite a bit of Red Hill data. This includes plotting the water levels measured during the monthly oil/water interface measurements and the recent pumpage (or lack there of) at the Red Hill Shaft.

The data seem to indicate there is no measurable groundwater gradient beneath the Red Hill USTs (i.e. from RHMW03 to RHMW01). When the RHS is pumping it does appear that a gradient develops between RHMW01 and RHMW05. However, with the RHS shutoff it appears that the gradient reverses. The attached spreadsheet contains graphs of the water levels in the tunnel wells taken summer and winter during three different years, and a time series of pumping at the RHS vs. the water level at RHMW01. I chose RHMW01 since it is a 1" well and the sampling pump has to be removed to do the oil/water interface measurements.

There are a couple of things to consider:

1. The water table elevations are only as good as the TOC survey. There were issues with the original 2006 TOC survey, and the 2009 re-survey only did RHMW05 and RHMW01. Corrections were estimated for the other wells based on the surveyed elevation of RHMW01.
2. After 2010 the downhole sampling pumps remained installed for all wells except RHMW01 during the monthly water level measurements. There is some interference between the Water Level Instrument cable and the pump tubing. This would bias the measurements toward lower water levels. The 2010 water levels measurements shown on the graph were taken with the sampling pumps removed and should provide the best estimation of gradient information for the wells inside of the tunnel.

The apparent lack of gradient was pointed out to NAVFAC and AECOM during the original Section 6&7 scoping meetings. However, they failed to consider the monthly water level measurements during subsequent meetings or in the development of the Work Plan.

Let me know if you have any questions or concerns about the data.

Thanks,
Bob W.